

Appl. No. 10/523,168
Reply to Office Action of July 6, 2007

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Withdrawn) A quartz crystal substrate used to form a twin in a quartz crystal by the hot pressing method, this quartz crystal substrate being characterized in that this substrate has, on one side, a step structure in which protruding parts that serve as pressure receiving surfaces for receiving the pressure of the pressing apparatus are formed, and this step structure is formed by a combination of a lithographic exposure technique and dry etching.
2. (Cancelled)
3. (Currently amended) A pressing apparatus for forming ~~used to form~~ a twin in a quartz crystal by the hot pressing method, comprising:
a lower block consisting of a lower heater block and a lower pressing plate;
an upper block consisting of an upper heater block and

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an upper pressing plate; and

a bearing block connecting to the upper heater block of
the upper block,

wherein the lower block and the upper block function to
hold the quartz crystal,

the lower pressing plate and the upper pressing plate are
constructed from a different material from the lower heater
block and the upper heater block,

either the lower pressing plate or the upper pressing
plate has a step structure with periodic protruding parts
satisfying quasi-phase matching condition for the quartz
crystal,

the upper heater block has a protruding part which is
worked into a convex surface with a radius of R_1 ,

the bearing block has a recessed part with is worked into
a concave surface with a radius of R_2 ($R_2 > R_1$), and

the protruding part and the recessed part are engaged to
generate a swinging mechanism ~~this pressing apparatus being~~
~~characterized in that the apparatus has~~

~~heater blocks, and pressing members that are constructed~~
~~from a different material from the material of these heater~~
~~blocks are attached to these heater blocks; and~~

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~~the portions of the surface of one of the pressing members that contact the portions of the quartz crystal that desirably undergo twinning, have a protruding shape that protrudes beyond the other portions.~~

4. (Cancelled)

5. (Currently amended) The pressing apparatus according to claim 3, ~~which is characterized in that~~ wherein the upper heater block and the lower heater block comprise the ~~apparatus has a heating mechanism in the pressing blocks, and this heating mechanism has a plurality of heaters,~~ respectively.

6. (Previously presented) The pressing apparatus according to Claim 3 which is characterized in that air pressure alone is used to generate the pressing force.

7. (Canceled)

8. (Withdrawn) A method for producing a step structure on a surface of a quartz crystal, the method comprising steps

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of;

applying a lithographic exposure technique to the
quartz, crystal; and
dry etching the quartz crystal.

9. (Withdrawn) The method according to Claim 8, wherein the
step of applying the lithographic exposure technique
further includes the steps of;

forming a Cr film on the surface of the quartz crystal;
coating a resist on the Cr film and exposing a portion
except, a predetermined portion; and

removing the exposed resist and Cr film to leave the Cr
film and resist on the predetermined portion; and

wherein the step of dry-etching comprises dry-etching
the surface using the Cr film and resist remaining on the
predetermined portion, as a mask.